Stoller
Grand Junction Office established 1959

299-E33-04 (A4865)
Log Data Report
(REVISION)

Borehole Information:

Borehole: 299-E33-04 (A4865)			Site: 216-B-46		
Coordinates (WA State Plane)		GWL (ft)[1]: 231.45		GWL Date: 12/14/01	
North	East	Drill Date	TOC[2] Elevation	Total Depth (ft)	Type
137693.11	573616.745	Dec. 1954	624.92 ft	231	Cable tool

Casing Information:

Casing Type	Stickup (ft)	Outer Diameter (in.)	Inside Diameter (in.)	Thickness (in.)	Top (ft)	Bottom (ft)
Steel Welded	2.6	8.625	7.875	0.375	+2.6	231
Steel Welded	2.5	4.5	4.0	0.25	+2.5	210

Borehole Notes:

Casing stickup was measured with a steel tape. Casing diameter and thickness were measured with an engineer's tape and caliper. Casing bottom was reported from information on the well construction and completion summary for this borehole included in Ledgerwood (1993). A 4' x 4' x 6" concrete pad surrounds this borehole at the ground surface.

According to the borehole completion summary, this borehole was drilled to 231 ft in December 1954, using 8-in. casing. At that time, groundwater was encountered at 222 ft. In March 1979, the 8-in. casing was perforated from 0 to 205 ft at 2 cuts/rd. A 4.5-in. OD casing was installed on a packer set at 210 ft. The annulus in the interval from 0 to 210 ft was grouted using 438 gallons of cement. A cement plug was installed from 228 to 231 ft.

Coordinates and TOC elevation were obtained from HWIS[3]. The GWL is derived from a measurement from TOC by Duratek Well Services Personnel.

Logging Equipment Information:

Logging System:	Gamma 1D		Type: SGLS (35%)
Calibration Date:	07/01	Calibration Reference:	GJO-2001-243-TAR
		Logging Procedure:	MAC-HGLP 1.6.5, Rev. 0

Logging System:	Gamma 1C		Type: HRLS
Calibration Date:	02/02	Calibration Reference:	GJO-2002-309-TAR
		Logging Procedure:	MAC-HGLP 1.6.5, Rev. 0

Spectral Gamma Logging System (SGLS) Log Run Information:

Log Run	1	2	3	4	5
Date	12/14/01	12/17/01	12/18/01		
Logging Engineer	Spatz	Spatz	Spatz		
Start Depth (ft)	3.0	233.0	48.0		
Finish Depth (ft)	49.0	135.0	136.0		
Count Time (sec)	200	200	200		
Live/Real	R	R	R		
Shield (Y/N)	N	N	N		
MSA Interval (ft)	1.0	1.0	1.0		
ft/min	N/A[4]	N/A	N/A		
Pre-Verification	A0060CAB	A0061CAB	A0062CAB		
Start File	A0060000	A0061000	A0062000		
Finish File	A0060046	A0061098	A0062088		
Post-Verification	A0060CAA	A0061CAA	A0062CAA		
Depth Return Error (ft)	-0.1	0	-0.12		

High Rate Logging System (HRLS) Log Run Information:

Log Run	1	2	3	4	5
Date	11/20/02	11/20/02			
Logging Engineer	Spatz	Spatz			
Start Depth (ft)	20.0	22.0			
Finish Depth (ft)	57.0	26.0			
Count Time (sec)	200	100			
Live/Real	R	R			
Shield (Y/N)	N	Internal			
MSA Interval (ft)	1.0	0.5			
ft/min	N/A	N/A			
Pre-Verification	AC048CAB	AC048CAB			
Start File	AC048000	AC048038			
Finish File	AC048037	AC048046			
Post-Verification	AC048CAA	AC048CAA			
Depth Return Error (ft)	0	0			

Logging Operation Notes:

This borehole was logged during December 2001 with the SGLS and during November 2002 with the HRLS. Fine-gain adjustments were not necessary during the logging runs. Zero reference is the top of casing. The log was run without the centralizer because the borehole ID is too small. ^{137}Cs and ^{60}Co were identified during logging.

Analysis Notes:

Analyst:	RGM/PDH	Date:	12/24/02	Reference:	GJO-HGLP 1.6.3, Rev. 0

The Log Data Report for this borehole was originally issued 2/12/02. This report has been revised to include high rate data analysis results and replaces the previously issued report. Pre-run and post-run verification spectra for the SGLS and HRLS were evaluated. Although the verification spectra were within control limits, the photopeak counts per second for the 2614.5-keV, 1461-keV, and 609-keV peaks were consistently lower in the SGLS post-run verification spectra when compared to the pre-run verification

spectra (typically by 4 to 8 percent). Examination of spectra indicates that the detector appears to have functioned normally during the log runs. The HRLS verification spectra also passed the acceptance criteria.

Individual spectra were processed in batch mode using APTEC Supervisor. Concentrations were calculated in EXCEL, using parameters determined from analysis of calibration data collected in June 2001 for the SGLS and February 2002 for the HRLS. From 0 to 213-ft depth, a casing thickness of 0.625 in. was used to calculate casing corrections. This thickness represents the combined thickness of the nominal 4-in. and 8-in. casings. From 213 ft to the maximum log depth at 233 ft, a casing thickness of 0.375 in. was used. These casing thicknesses are consistent with those measured by the logging engineer in the field. A correction for water in the borehole was applied below 231.45 ft. Dead time corrections were applied where dead time exceeded 10.5 percent. Data in borehole intervals where SGLS dead time exceeds 40 percent are considered less reliable and HRLS data are substituted for the SGLS data.

Log Plot Notes:

Separate log plots are provided for gross gamma and dead time, naturally occurring radionuclides (^{40}K, ^{238}U, and ^{232}Th), and ^{137}Cs. For each radionuclide, the energy value of the spectral peak used for quantification is indicated. Zero reference is the top of the casing. Unless otherwise noted, all radionuclides are plotted in picocuries per gram (pCi/g). The open circles indicate the minimum detectable level (MDL) for each radionuclide. Error bars on each plot represent error associated with counting statistics only and do not include errors associated with the inverse efficiency function, dead time correction, or casing correction. A combination plot is also included to facilitate correlation.

SGLS data are also plotted against radionuclide logging system (RLS) data collected in September 1997 using a detector system with similar characteristics. The RLS and SGLS man-made radionuclide data have been corrected for decay to the date of HRLS logging on November 20, 2002.

Results and Interpretations:

^{137}Cs and ^{60}Co were detected in this borehole. ^{137}Cs was detected from 5 to 6 ft and continuously from 12 to 88 ft. Between 20 and 57 ft, ^{137}Cs concentrations are greater than 1,000 pCi/g, and concentrations as high as 1,000,000 pCi/g were measured at a depth of 25 ft. Intervals of maximum concentration occur at 20 to 28 ft, 34 to 37 ft, and 43 ft. Below 72 ft, ^{137}Cs concentrations are less than 1 pCi/g.

^{60}Co was detected almost continuously from about 40 ft to total depth at 233 ft. Zones of maximum ^{60}Co concentration occur from 91 to 97 ft, 99 to 103 ft, and 224 to 233 ft, where concentrations are between 15 and 25 pCi/g.

This borehole was logged by the Westinghouse Hanford Company Radionuclide Logging System (RLS) in 1997. Comparison of RLS and SGLS data shows generally good agreement. Possible increases in ^{60}Co concentrations may have occurred at about 47 ft, between 107 and 122 ft, and between 229 and 233 ft since 1997. The latter depth interval lies just above and below the groundwater level reported at 231.45 ft in December 2001.

Very little character is evident in the KUT logs. This is due in part to the effects of the dual casing string and grout.

It is recommended this borehole be re-logged in the future to evaluate potential movement of contaminants through the vadose zone, particularly in the depth intervals mentioned above where ^{60}Co levels may be changing.

References:

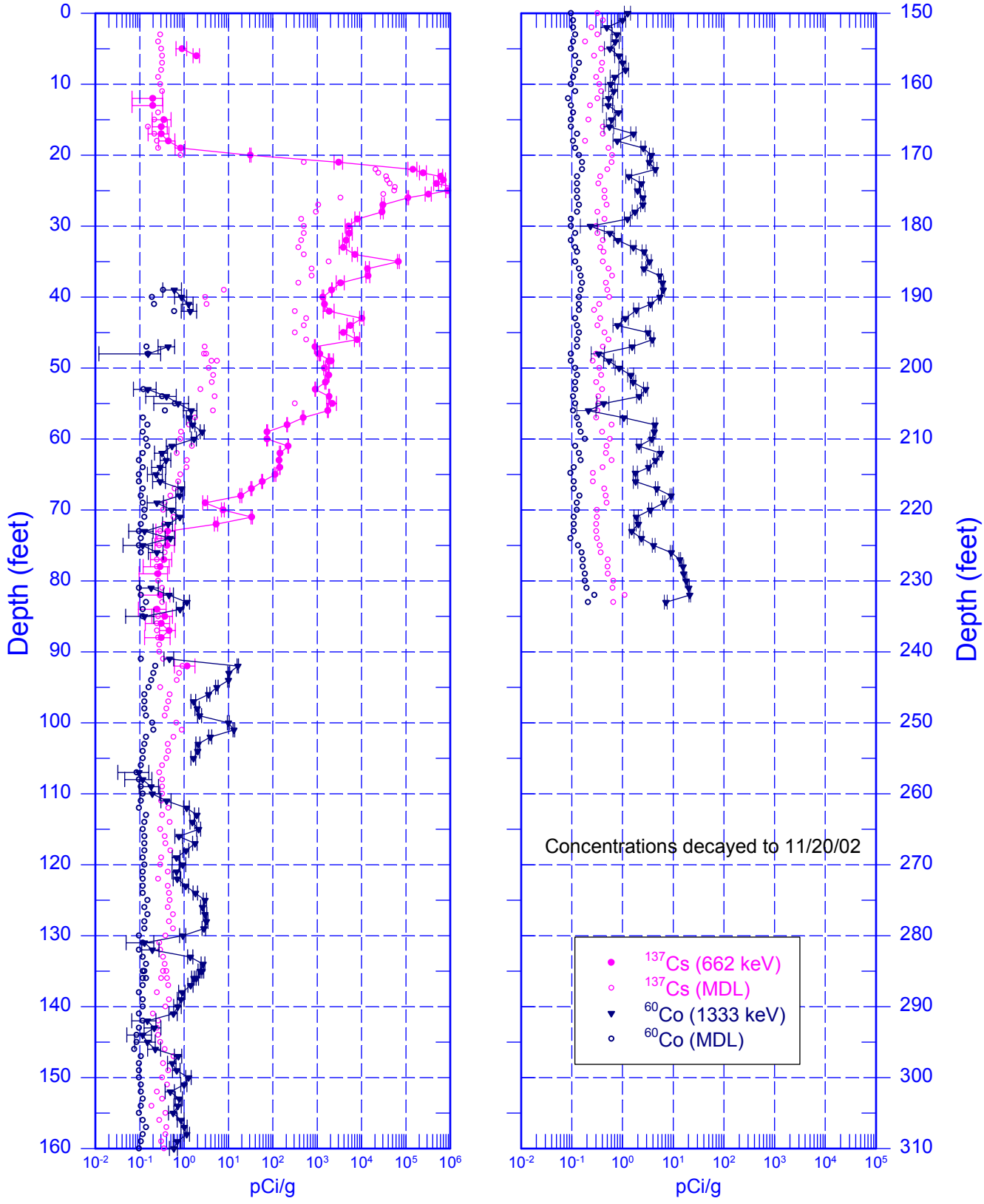
Ledgerwood, R.K. 1993. *Summaries of Well Construction Data and Field Observations for Existing 200-East Resource Protection*, WHC-SD-ER-TI-007, Revision 0, Westinghouse Hanford Inc., Richland, Washington.

---

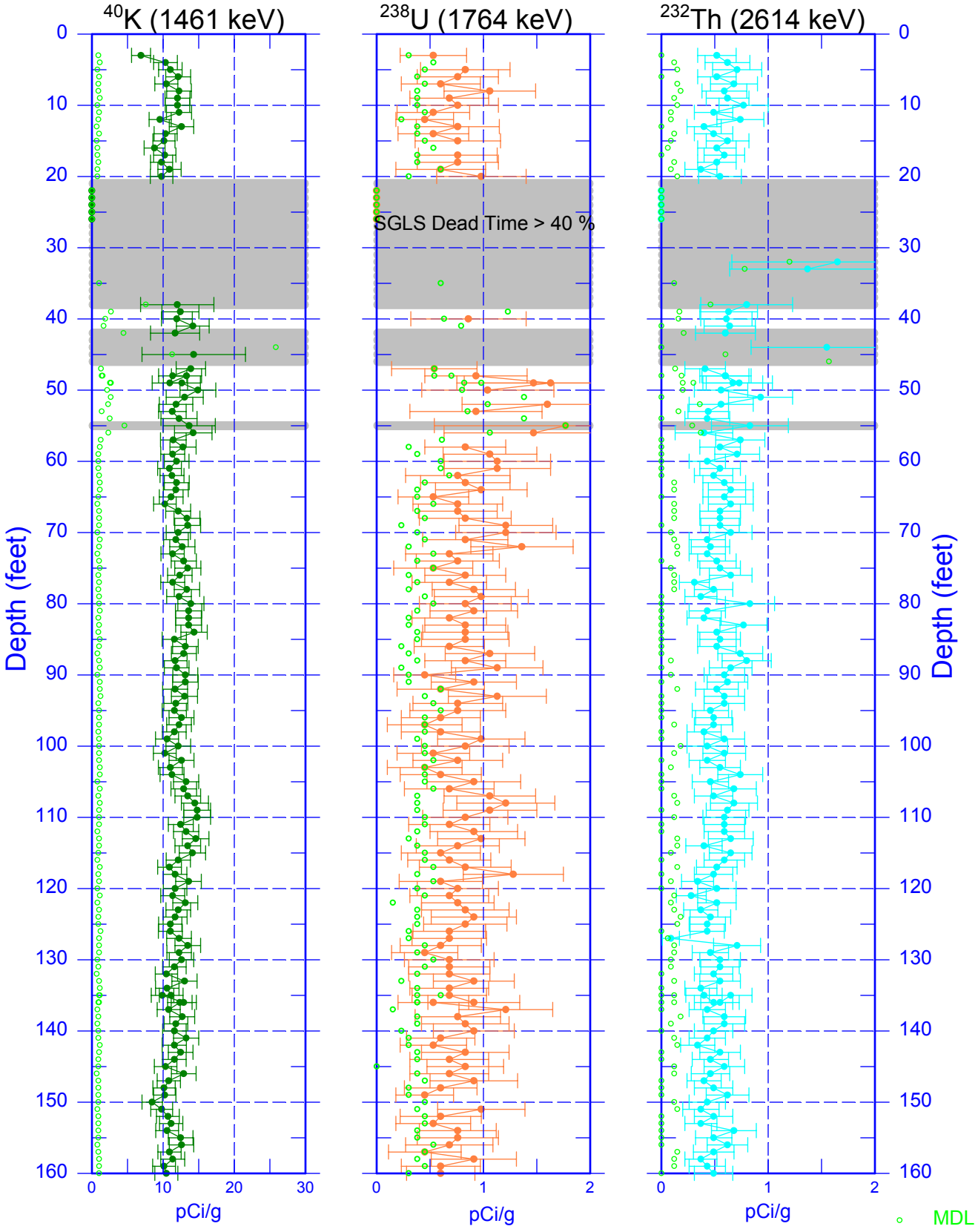
[1] GWL – groundwater level
[2] TOC – top of casing
[3] HWIS – Hanford Well Information System
[4] n/a – not applicable

299-E33-04 (A4865)

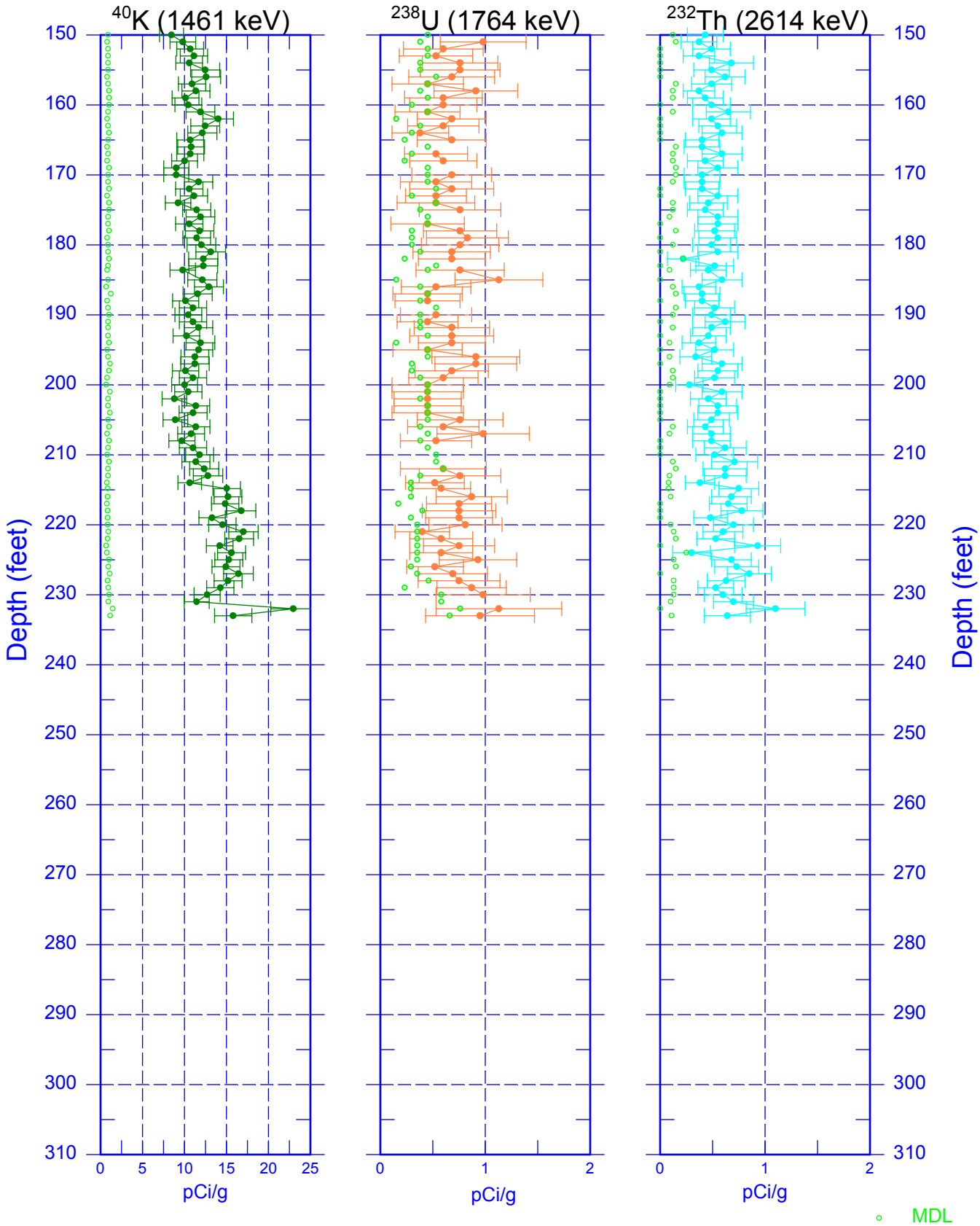
Man-Made Radionuclide Concentrations



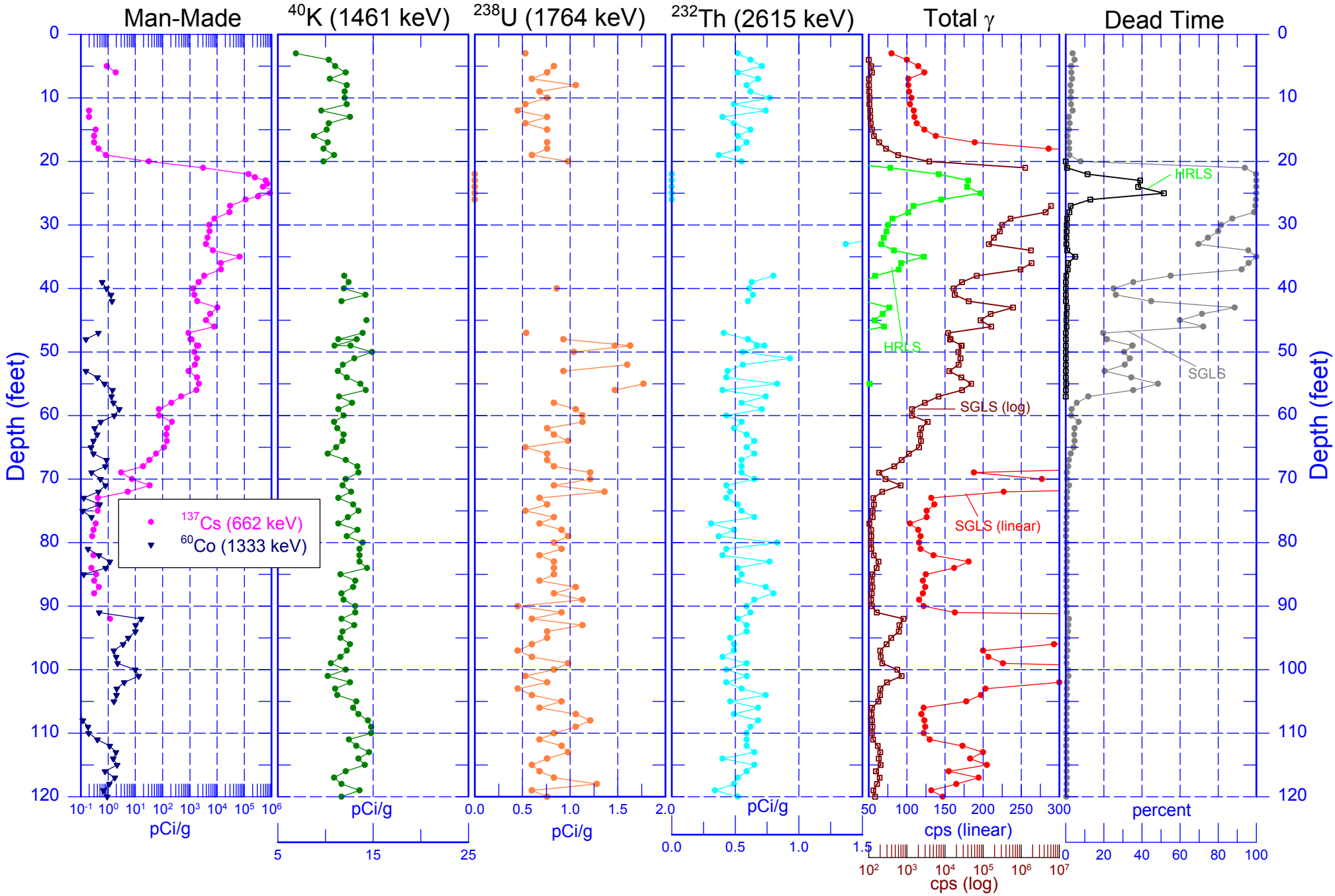
299-E33-04 (A4865)
Natural Gamma Logs



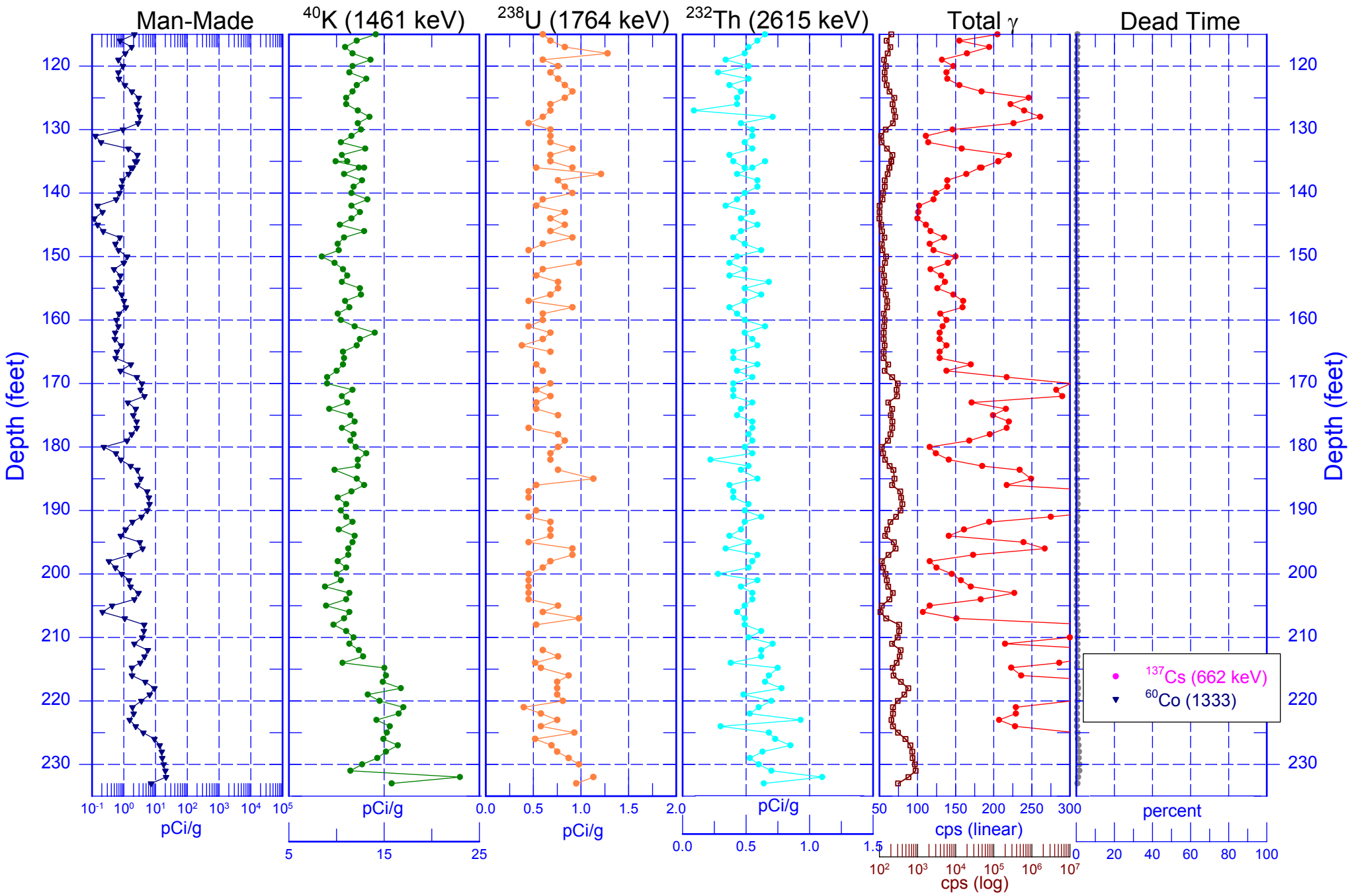
299-E33-04 (continued)
Natural Gamma Logs



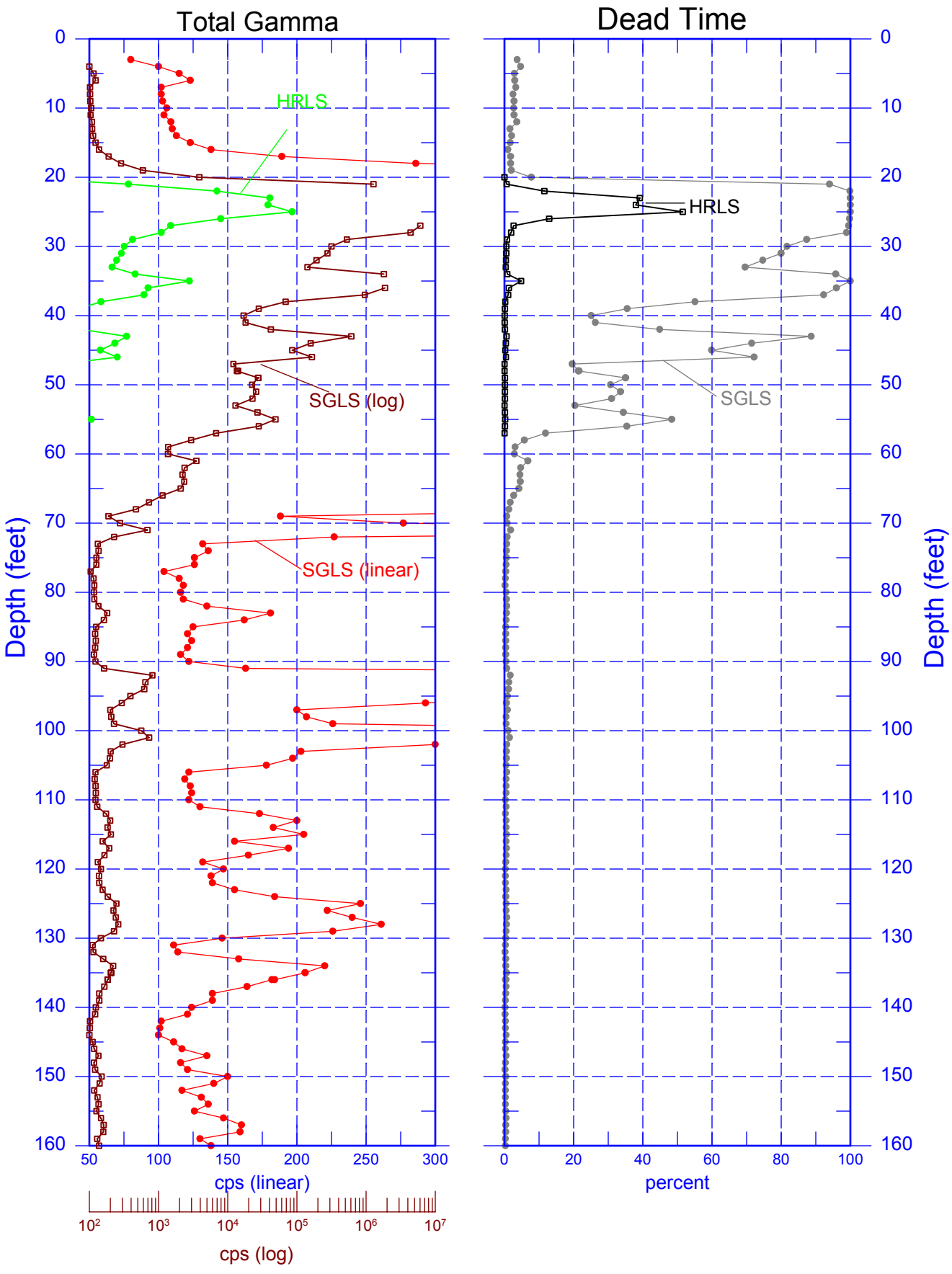
299-E33-04 (A4865) Combination Plot



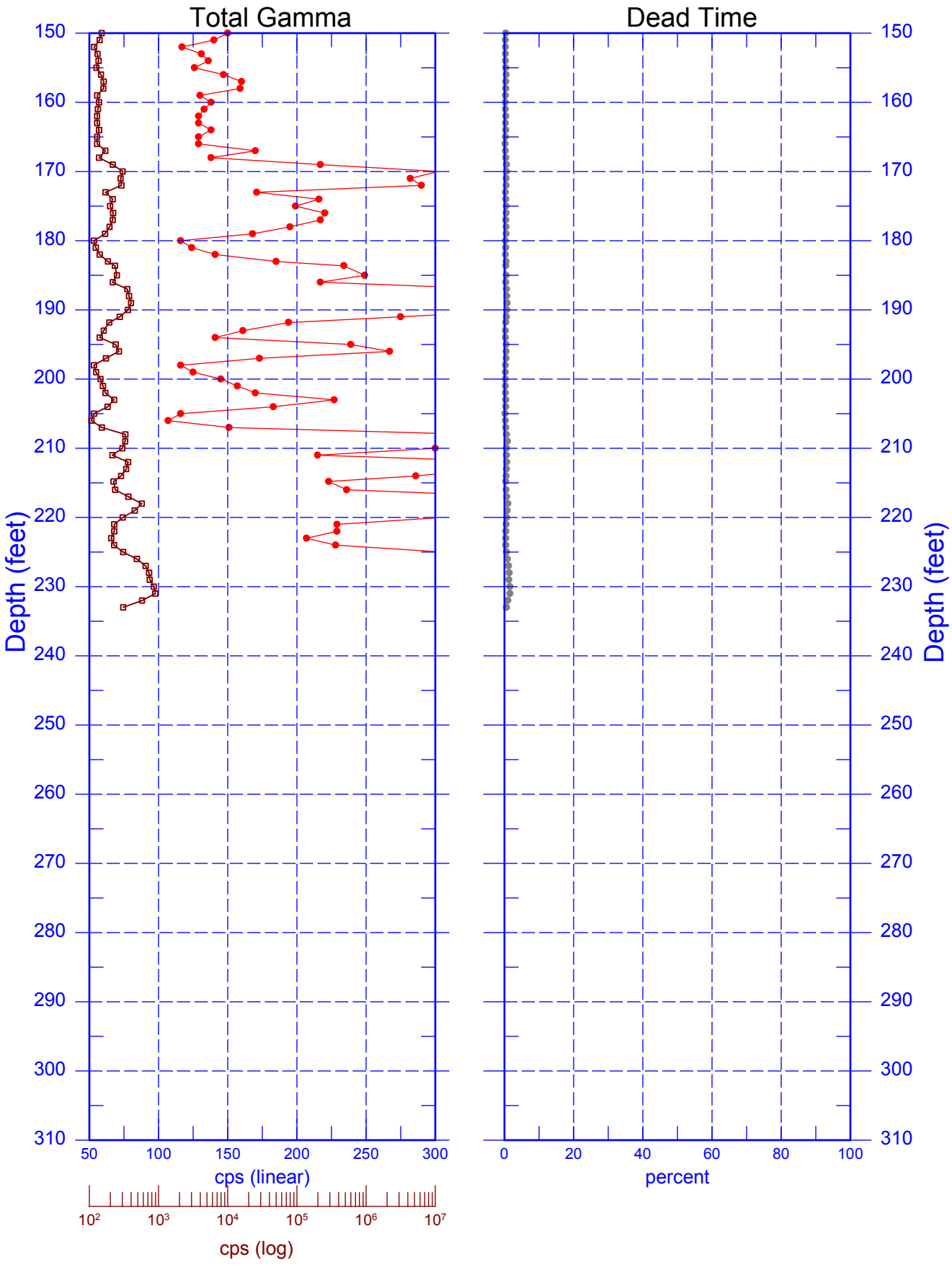
299-E33-04 (A4865) Combination Plot



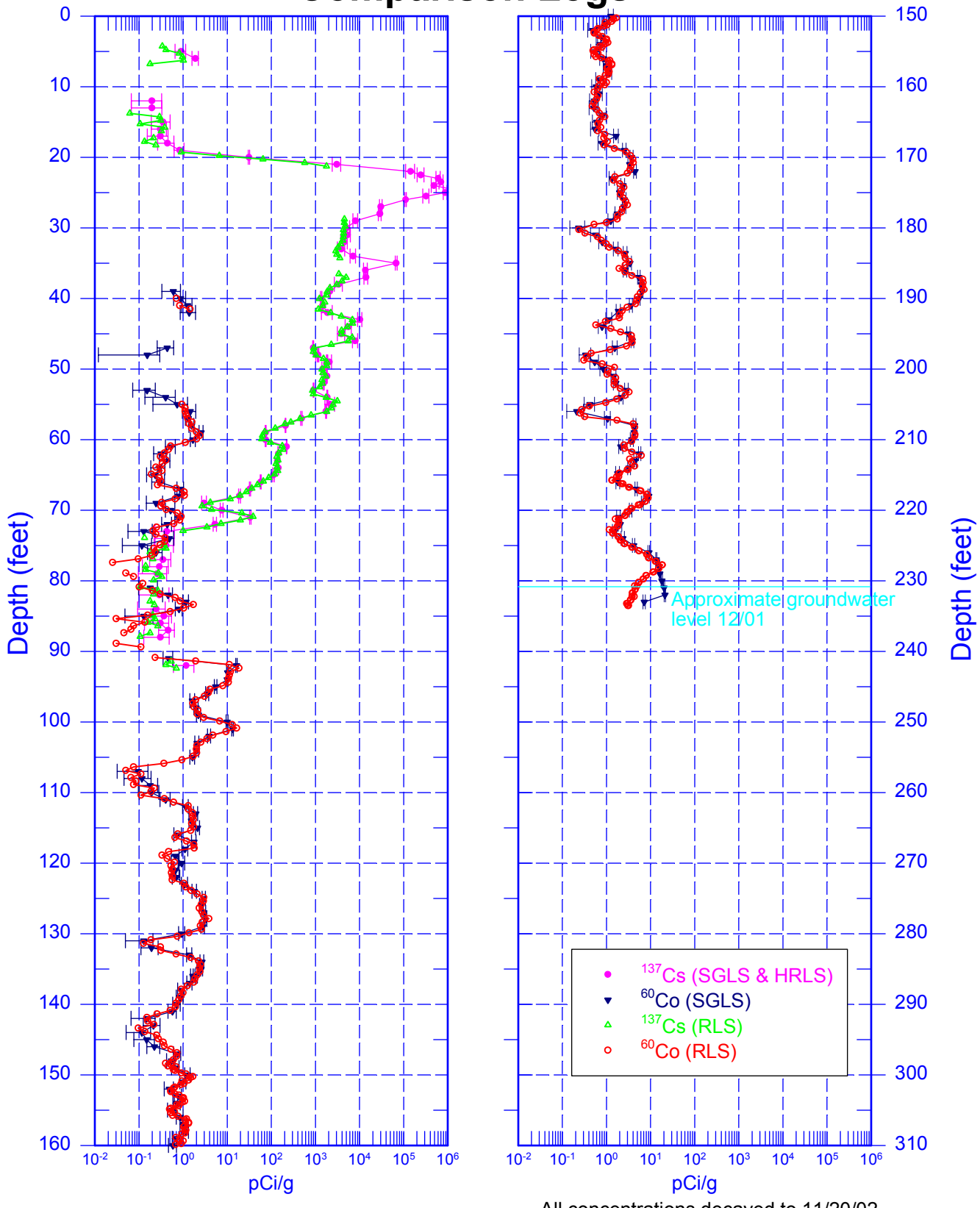
299-E33-04 (A4865)
Total Gamma & Dead Time



299-E33-04 (A4865)
Total Gamma & Dead Time



299-E33-4 (A4865)
RLS (1997), SGLS (2001), and HRLS (2002)
Comparison Logs



All concentrations decayed to 11/20/02